405 KAR 18:120. Use of explosives.

RELATES TO: KRS 350.151, 350.430
STATUTORY AUTHORITY: KRS Chapter 13A, 350.020, 350.028, 350.151, 350.465
NECESSITY, FUNCTION, AND CONFORMITY: KRS Chapter 350 in pertinent part requires the cabinet to promulgate rules and administrative regulations establishing performance standards for protection of people and property, land, water and other natural resources, and aesthetic values, during underground mining activities and for restoration and reclamation of surface areas affected by underground mining activities. This administrative regulation sets forth specific requirements for the use of explosives for surface blasting, including qualified supervision of blasting, preblasting surveys, warning signals, restrictions on timing and location of blasting, limitations on airblast and ground vibration, seismographic measurements, and records of surface blasting operations.

Section 1. General Requirements. (1) This administrative regulation applies only to surface blasting activities incident to underground mining, including but not limited to, initial rounds of slopes and shafts.

(2) Each permittee and each person who conducts blasting operations shall comply with all applicable local, state, and federal laws and regulations in the use of explosives.

(3) Each permittee shall have all surface blasting operations conducted under the direction of a blaster certified in accordance with 405 KAR 7:070. A certified blaster and at least one (1) other person shall be present at the firing of a blast. Persons responsible for blasting operations at a blasting site shall be familiar with the blasting plan and site-specific performance standards.

(4)(a) An anticipated blast design shall be submitted if blasting operations will be conducted within:

1. 1,000 feet of any building used as a dwelling; public building; school; church; or commercial, community, or institutional building outside the areas affected by surface operations and facilities; or

2. 500 feet of an active or abandoned underground mine.

(b) The blast design shall be presented as part of the permit application or shall be submitted to the department's appropriate regional office at least thirty (30) days prior to initiation of the blast.

(c) The blast design shall contain sketches of the drill patterns, delay periods, and decking; shall indicate the types and amounts of explosives to be used, critical dimensions, and the locations of structures to be protected; shall include a general description of structures to be protected; and shall contain a discussion of design factors to be used, which protect the public and meet the applicable airblast, flyrock, and ground vibration standards in this administrative regulation.

(d) The blast design shall be prepared and signed by a certified blaster.

(e) The cabinet may require changes to the design submitted in order to ensure compliance with KRS Chapter 350; SMCRA; and 405 KAR Chapters 7 through 24.

Section 2. Preblasting Survey. (1) At least thirty (30) days before initiation of blasting, the permittee shall notify, in writing, all residents or owners of dwellings or other structures located within one-half (1/2) mile of the areas affected by surface operations and facilities how to request a preblasting survey in accordance with subsection (2) of this section.

(2) A resident or owner of a dwelling or other structure within one-half (1/2) mile of any part of the areas affected by surface operations and facilities may request a preblasting survey. This request shall be made in writing directly to the permittee or to the cabinet which shall promptly notify the permittee. The permittee shall promptly conduct a preblasting survey of the dwelling or structure. If a structure is renovated, modified, or added to subsequent to a preblasting survey, then, upon request a survey of such additions and renovations shall be performed in accordance with this section.

(3) The survey shall determine the condition of the dwelling or structure and document any pre-

blasting damage and other physical conditions that could reasonably be affected by the blasting. Structures such as pipelines, cables, transmission lines and cisterns, wells, and other water systems warrant special attention; however, the assessment of these structures may be limited to surface condition and readily available data unless additional data are specifically required by the cabinet.

(4) A written report of the survey shall be promptly prepared and signed by the person who conducted the survey. The report may include recommendations of any special conditions or proposed adjustments to the blasting procedure which should be incorporated into the blasting plan to prevent damage. If the resident or structure owner or his representative accompanies the surveyor, the report shall contain the name of such person. Copies of the report shall be promptly provided to the person requesting the survey and to the cabinet. If the person requesting the survey disagrees with the results of the survey, he or she may submit, in writing to both the permittee and the cabinet, a detailed description of the specific areas of disagreement. The cabinet may require additional measures to ensure that adequate and accurate information is included in the preblasting survey and to ensure compliance with the requirements of this administrative regulation.

(5) Any surveys requested more than ten (10) days before the planned initiation of blasting shall be completed by the permittee before the initiation of blasting.

Section 3. Surface Blasting Requirements. (1) General requirements.

(a) The permittee shall notify, in writing, each residence within one-half (1/2) mile of the areas affected by surface operations and facilities, the appropriate department regional office, and local governments and public utilities of the proposed times and locations of blasting operations and the characters, patterns, and meanings of the warning and all-clear signals. Such notice shall be served no less than twenty-four (24) hours and no more than thirty (30) days before blasting will occur.

(b) All blasting shall be conducted between sunrise and sunset. The cabinet may specify more restrictive time periods based on public requests or other relevant information and according to the need to adequately protect the public from adverse noise and other impacts. Blasting may, however, be conducted between sunset and sunrise if:

1. A blast that has been prepared during the day must be delayed due to the occurrence of an unavoidable hazardous condition and cannot be delayed until the next day because a potential safety hazard could result that cannot be adequately mitigated;

2. Prior approval for conducting the blasting between sunset and sunrise is obtained from the Kentucky Office of Mine Safety and Licensing; and

3. A complete written report of blasting at night is filed by the permittee with the cabinet not later than three (3) days after the night blasting, not including Saturdays, Sundays, or legal holidays. The report shall include a detailed description of the reasons for the delay in blasting including why the blasting could not be held over to the next day, identification of the time at which the blast was actually conducted, a description of the warning notices given, and a copy of the blast record required by Section 5 of this administrative regulation.

(c) Unscheduled blasts may be conducted only where public or operator health and safety so require and for emergency blasting actions. When a permittee conducts an unscheduled blast, the permittee, using audible signals, shall notify all persons within one-half (1/2) mile of the blasting site and document the reason for the unscheduled blast in accordance with Section 5(20) of this administrative regulation.

(d) The use of a charge weight of explosives in excess of 40,000 pounds in any blast shall not occur without a valid permit for such blasting from the Kentucky Office of Mine Safety and Licensing. Such a permit shall be present at the blast site while such blasting is being conducted.

(2) Warnings. Warning and all-clear signals of different character or pattern that are audible within a range of one-half (1/2) mile from the point of the blast shall be given. Each person within the areas affected by surface operations and facilities and each person who resides or regularly works within

one-half (1/2) mile of the areas affected by surface operations and facilities shall be notified of the meanings of the signals as identified in the blasting notification required in subsection (1) of this section through appropriate communications. These notifications shall be periodically delivered or otherwise communicated to such persons in a manner which can reasonably be expected to inform such persons of the meanings of the signals. Delivery or other appropriate communication of the meanings of such signals to the head of a household or to the person in charge of a place of business shall constitute sufficient notification of the meanings of such signals to all persons at such household or place of business. Each permittee shall maintain signs in accordance with 405 KAR 18:030, Section 6.

(3) Access control. Access to the blasting area shall be controlled to prevent the presence of livestock or unauthorized personnel during blasting until the blaster has reasonably determined:

(a) That no unusual circumstances, such as imminent slides or undetonated charges, exist; and

(b) That access to and travel in or through the blasting area can be safely resumed.

(4)(a) Airblast. Airblast shall be controlled so that it does not exceed the values specified in Appendix A of this administrative regulation at any dwelling; public building; school; church; or commercial, community, or institutional building outside the areas affected by surface operations and facilities except as provided in subsection (8) of this section.

(b) In all cases except those involving the use of C-weighted, slow-response devices, the measuring systems used shall have a flat frequency response of at least 200 Hz at the upper end. The C-weighted shall be measured with a Type 1 sound level meter that meets the standard American National Standards Institute (ANSI) S1.4 1971 specifications.

(c) If necessary to prevent damage, the cabinet shall specify lower maximum allowable airblast levels than those in Appendix A of this administrative regulation for use in the vicinity of a specific blasting operation.

(d)1. To evaluate compliance with the airblast standards of this administrative regulation, throughout surface blasting operations the permittee shall periodically monitor compliance with the airblast standards.

2. Monitoring pursuant to this paragraph shall be deemed "periodic" if at least three (3) consecutive blasts are monitored one (1) time during the period of January through June and one (1) time during the period of July through December; provided however:

a. The cabinet may approve or require an alternative frequency if deemed appropriate based on site conditions, the anticipated blast design, the proposed blasting plan, and any other pertinent information available to the cabinet. A plan for less frequent airblast monitoring shall be deemed approved if the plan is specified as a condition of permit issuance or is specified in the approved permit application and not modified by a condition of permit issuance. A plan for more frequent airblast monitoring shall be established in the approved permit application, as a condition of permit issuance, or after permit issuance in accordance with subparagraph 3 of this paragraph.

b. If detonation of explosives did not occur during the designated monitoring period, airblast monitoring need not be conducted during that period.

3. Subsequent to permit issuance, the cabinet may require airblast measurements of any or all blasts and may specify the locations of such measurements.

4. The results of all airblast monitoring shall be recorded in accordance with Section 5 of this administrative regulation.

(5) Flyrock. Flyrock, including blasted material traveling along the ground, shall not be cast from the blasting site more than half the distance to the nearest dwelling; public building; school; church; commercial, community, or institutional building; or any occupied structure and in no case beyond the boundary of the areas affected by surface operations and facilities, or beyond the area of regulated access required under subsection (3) of this section.

(6) Prevention of adverse impacts. Blasting shall be conducted to prevent injury to persons; dam-

age to public and private properties outside the areas affected by surface operations and facilities; adverse impacts on any underground mine; changes in the courses, channels, and availability of surface waters outside the areas affected by surface operations and facilities; and alterations of the ground water flow systems and ground water availability outside the areas affected by surface operations and facilities.

(7) Ground vibration.

(a) General. In all blasting operations except as otherwise authorized by subsection (8) of this section, the maximum ground vibration shall not exceed the values approved in the blasting plan required under 405 KAR 8:040. The maximum ground vibration at the location of any dwelling; public building; school; church; or commercial, community, or institutional building outside the areas affected by surface operations and facilities shall be established in accordance with either the maximum peak particle velocity limits of paragraph (b) of this subsection, in accordance with the scale-distance equations of paragraph (c) of this subsection, in accordance with the blasting-level equations of paragraph (d) of this subsection, or by the cabinet pursuant to paragraph (e) of this subsection. All other structures in the vicinity of the blasting area, such as water towers, pipelines, and other utilities; tunnels; dams; impoundments; and underground mines shall be protected from damage by establishment of a maximum allowable limit on the ground vibration proposed by the applicant in the blasting plan and approved by the cabinet.

(b) Maximum peak particle velocity. The maximum ground vibration shall not exceed the limits established in Appendix B of this administrative regulation at the location of any dwelling; public building; school; church; or commercial, community, or institutional building outside the areas affected by surface operations and facilities. Seismographic records shall be recorded for each blast.

(c) Scale-distance equations.

1. A permittee may use the scale-distance equations of Appendix C of this administrative regulation to determine the allowable charge weight of explosives to be detonated within any eight (8) millisecond period without seismic monitoring.

2. The development of a modified scale-distance factor may be authorized by the cabinet based on a written request by the permittee supported by seismographic records of blasting at the mine site. The modified scale distance factor shall be determined such that the particle velocity of the predicted ground vibration will not exceed the limits established in Appendix B of this administrative regulation at a ninety-five (95) percent confidence level.

(d) Blasting-level equations. A permittee may use the ground vibration limits calculated from the blasting-level equations in Appendix D of this administrative regulation to determine the maximum allowable ground vibration. If the blasting-level equations are used, a seismographic record including both particle velocity and vibration-frequency levels shall be provided for each blast. The method for the analysis of the predominate frequency contained in the blasting records shall be approved by the cabinet before application of this alternative blasting criterion.

(e) The maximum allowable ground vibration shall be reduced by the cabinet beyond the limits of this subsection if the cabinet determines that lower limits are necessary to provide damage protection and ensure compliance with subsection (6) of this section.

(8) The maximum airblast and ground vibration standards of this section shall not apply at the following locations:

(a) At structures owned by the permittee and not leased to another party; and

(b) At structures owned by the permittee and leased to another party, if a written waiver by the lessee is submitted to the cabinet prior to blasting.

Section 4. Seismographic Measurements. (1) The maximum peak particle velocity shall be recorded as either the largest of the peak particle velocities measured in three (3) mutually perpendicular directions or the vector sum thereof.

(2) The cabinet may require a permittee to conduct seismic monitoring of any or all blasts and may specify the location at which such measurements are taken and the degree of detail necessary in the measurement.

Section 5. Records of Blasting Operations. A record of each blast, including any required seismograph reports, shall be retained for at least five (5) years and shall be available for inspection by the cabinet and the public on request. The record shall contain the following data:

(1) Name of the permittee.

(2) Location, date, and time of the blast.

(3) Name, signature, certification number, and license number of the blaster in charge of the blast.

(4) Identification of and direction and distance, in feet, from the nearest blast hole to the nearest dwelling; public building; school; church; or commercial, community, or institutional building outside the permit area, except those described in Section 4(8) of this administrative regulation.

(5) Weather conditions, including those which may cause possible adverse blasting effects.

(6) Type of material blasted.

(7) Sketches of the blast pattern including number of holes, burden, spacing, decks, and delay pattern.

(8) Diameter and depth of holes.

(9) Types of explosives used.

(10) Total weight of explosives used.

(11) Total weight of explosives used per hole.

(12) Maximum weight of explosives detonated within any eight (8) millisecond period.

(13) Maximum number of holes detonated within any eight (8) millisecond period.

(14) Type of initiation system.

(15) Type of circuit.

(16) Type and length of stemming.

(17) Mats or other protection used.

(18) Type of delay detonator and delay periods used.

(19) Seismographic and airblast records, if used, which include for each record:

(a) Type of instrument, sensitivity, and either calibration signal or certification of annual calibration;

(b) Exact location of instrument and the date of, time of, and distance from the blast;

(c) For seismographic records, the actual seismographic record.

(d) Name of the person and firm taking the reading;

(e) Name of the person and firm analyzing the seismographic record; and

(f) As applicable, vibration and airblast levels recorded.

(20) Reasons and conditions for each unscheduled blast.

Appendix A of 405 KAR 18:120 Airblast Limitations	
Lower frequency limit of measuring system in Hz (+3dB)	Maximum level in dB
*0.1 Hz or lower - flat response	134 peak
2 Hz or lower - flat response	133 peak

6 Hz or lower - flat response	129 peak
*C-weighted, slow response	105 peak dBC

*These measuring systems shall be used only when approved by the cabinet.

Appendix B of 405 KAR 18:120	
Peak Particle Velocity Limits	
Distance from the blasting site in feet	Maximum allowable peak particle velocity for ground vibration in inches per second
0 to 300	1.25
301 to 5,000	1.00
5,001 and beyond	0.75

Appendix C of 405 KAR 18:120	
Scale-distance Equations	
Distance (D) from the blasting site in feet	Scale-distance equation
0 to 300	$W = (D/50)^2$
301 to 5,000	$W = (D/55)^2$
5,001 and beyond	$W = (D/65)^2$

where: W = the maximum weight of explosives that can be detonated within any eight (8) millisecond period.

where: D = the distance, in feet, from the blasting site to the nearest protected structure.

Appendix D of 405 KAR 18:120	
Blasting-level Equations	
Blasting vibration frequency	Blasting-level equation
Hz < 4	$V = 0.19\ Hz^{0.9904}$
4 < Hz < 11	V = 0.75
11 < Hz < 30	$V = 0.0719\ Hz^{0.9776}$
Hz > 30	V = 2.00

where: Hz = the blast vibration frequency in hertz.

where: V = the maximum allowable particle velocity in inches per second. (8 Ky.R. 1568; eff. 1-6-1983; 11 Ky.R. 1296; 1603; eff. 5-14-1985; 15 Ky.R. 491; eff. 12-13-1988; TAm eff. 8-9-2007; Crt eff. 7-3-2018.)